



# Research Indaba\* 19

SCHOOL OF ARCHITECTURE AND THE BUILT ENVIRONMENT

UNIVERSITY OF LINCOLN

B O O K   O F   A B S T R A C T S

13 MARCH 2019



\* Indaba is an isiZulu word for a community meeting

Research Indaba'19

Good Design emerges through Good Research

School of Architecture and the Built Environment  
College of Arts  
University of Lincoln  
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Research Themes:

Sustainable Architecture and Built Environment

Culture, Society and Space

Construction Science: technology, materials and management

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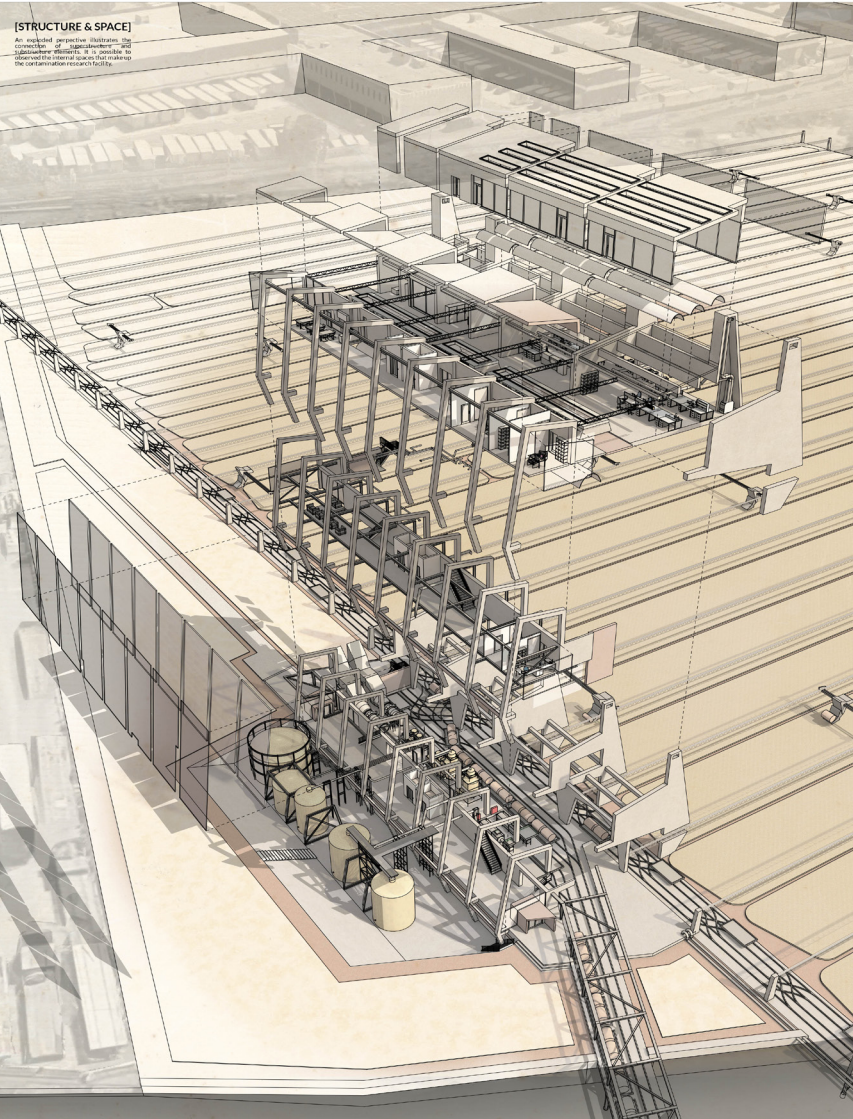
BOOK OF ABSTRACTS





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[STRUCTURE & SPACE]  
An exploded perspective illustration of  
concrete, steel, and glass structure – and  
landscape elements. It is possible to  
dissect the entire space that contains  
the contamination research facility.

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## Natural Environment



## Social Cohesion



## Local Economy



## Built Environment



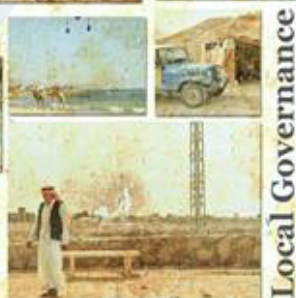
## Culture



## Human Capital



## Local Governance



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## *Research in the Lincoln School of Architecture and the Built Environment*

Research in the School of Architecture  
and the Built Environment is undertaken  
through three interconnected research  
themes.

The research themes are:

**Sustainable Architecture and Built  
Environment: buildings and cities**

**Culture, Society and Space**

**Construction Science: technology, materials  
and management**





## Sustainable Architecture and Built Environments: buildings and cities

*The focus of this theme is theoretical and applied research concerned with reducing the environmental impact of buildings and cities to safeguard the environment as well as to enhance the health and wellbeing of people.*

### Key areas:

- Sustainable design and construction
- Sustainable planning and development
- Low energy building design
- Building performance analysis
- In situ thermal measurements and monitoring
- Post occupancy evaluation
- User comfort and satisfaction
- Whole life cycle assessment of buildings
- Energy management and carbon foot printing
- Eco-refurbishment/conversion
- Building Information Modelling (BIM)
- Data Integration Design (Big Data and the Internet of Things)





## Culture, Society and Space

*This research theme is concerned with relationships between the cultural, social and spatial characteristics of built environments and communities. This work includes analysis of the spatial morphology of informal settlements, which are a growing global phenomenon. This theme is also concerned with the health and wellbeing of societies, with an emphasis on the challenges facing an increasingly aging population.*

### Key areas:

- Space Syntax: theory and modelling
- Spatial morphology of buildings and cities
- Informal settlements
- Refugee settlements
- African traditional architecture
- Low income housing
- Theories of architecture and urbanism
- Place making
- History of architecture and urban design
- Cultural heritage
- Urban regeneration
- Social meaning of built environments
- Vernacular architecture
- Architecture and material culture
- Houses and households
- Building types and built forms
- Spatial agency
- Aging population








# Construction Science: technology, materials and management

*Researchers within this theme are engaged in work that addresses innovation in construction science, contemporary and traditional building materials and techniques, fabrication efficiency and the management of building processes.*

## Key areas:

- Environmental design
- Construction science and technology
- Energy, carbon and buildings
- Integration of structure, services and fabric
- Health, comfort and wellbeing
- Renewable energy and smart grids
- Material innovations
- Conservation of heritage buildings
- Digital engineering
- Building Information Management
- Procurement of sustainable buildings
- Modern Methods of Construction
- Population dynamics and the built environment
- Ecology and natural architecture
- Lean Construction
- Construction Procurement Systems
- Supply-Chain Management



## Transforming Schools of Architecture: Research and the Need for Disciplinary Demobilization

Prof. Glen Mills

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The characteristic feature of architectural education is that it involves widely different types of knowledge... Furthermore, the universities will require something more than a study of techniques and parcels of this or that form of knowledge. They will expect and have right to expect that knowledge will be guided and developed by principles: that is by theory. Research is the tool by which theory is advanced. Without it teaching can have no direction and thought no cutting edge'.

Martin L (1973: viii) Foreword, in March L (Ed) The architecture of form, Cambridge: Cambridge University Press.

That was how Professor Leslie Martin summed up the watershed RIBA Oxford Conference on Architectural Education in 1958. His was a plea for architecture schools to embed disciplined, peer-reviewed research at the centre of education, if it was to be relevant. I believe that, with a few exceptions, Professor Martin's plea has fallen on deaf ears. Indeed, if he was around today he would be frustrated and bitterly disappointed with the gloomy, inconsequential state of architectural education.

It's time for action, so consider this: Architectural education has got to transform profoundly, and quickly, if it is to help liberate architecture schools, and the profession, from the margins of relevance and value they continue to occupy. This gradual process of negative value-drift started several decades ago. Architectural education, because it has largely neglected the realities of practice and the rigours of academic research, has played a significant role in its decline to triviality.

1993: That was when I delivered my inaugural lecture, which is a requirement once appointed to a chair, or full professorship, in the University of the Witwatersrand, Johannesburg. The title was 'Architecture, Housing, and South Africa: Research Matters in an Age of Anxiety'.

The lecture reported on, what was then, my latest published research findings on the need for radical, ground-breaking ways to deliver low-income, mass housing in a post-apartheid environment. It was delivered in the context of those electrifying and fearsome, yet exhilarating, days leading up to the collapse of apartheid. Democracy was in sight. But the nation, everywhere, was tinged with uncertainty, stress and tension. The country was on edge... it was an extremely anxious moment.

I say this because the same can be said about the world we live in today. Except for one thing: the situation today is unarguably a lot more perilous than what it was nearly 30 years ago.

Uncertainty about the present, and anxiety about the future are ubiquitous. There are still concerns, not only in South Africa, but everywhere, about the immense need for low-income mass housing and urban infrastructure. The suite of issues has widened to include concerns about growing unemployment, rapid urbanisation, proliferation of slums, debilitating poverty, widening inequalities, extremism, conflicts, terrorism, food insecurity, displaced populations and refugees.

So much for the socio-economic picture. Now map this on to the physical collage: environmental degradation, pollution, extinction of species, water shortages and drought, the need for alternative energy sources, health threats, climate change, and built environments that far exceed their energy-budgets. You should then get the bleak visual of a world in crisis, the symptoms of which include socio-economic deterioration and environmental devastation.

There is hope, but it is contingent on a few things. First, because all of us have agency, these mega-issues have got to inform everything we do. In that regard, progress was made when these issues were used to define the so-called 'grand challenges' facing the planet. Second, these issues have got to shape action plans for sustainable development (economically, socially and environmentally). The United Nations report, 'Transforming Our World: The 2030 Agenda for Sustainable Development' is leading the way here, especially in its articulation of the 17 Sustainable Development Goals (SDG)

and targets. Third, for all academic subjects, but especially for the built environment disciplines, all 17 SDGs are pertinent if we are to educate savvy, fit-for-purpose graduates.

So here's the thing: We need to produce new knowledge, through rigorous research, in order to construct new intellectual frameworks, or theories, for making the world a better place.

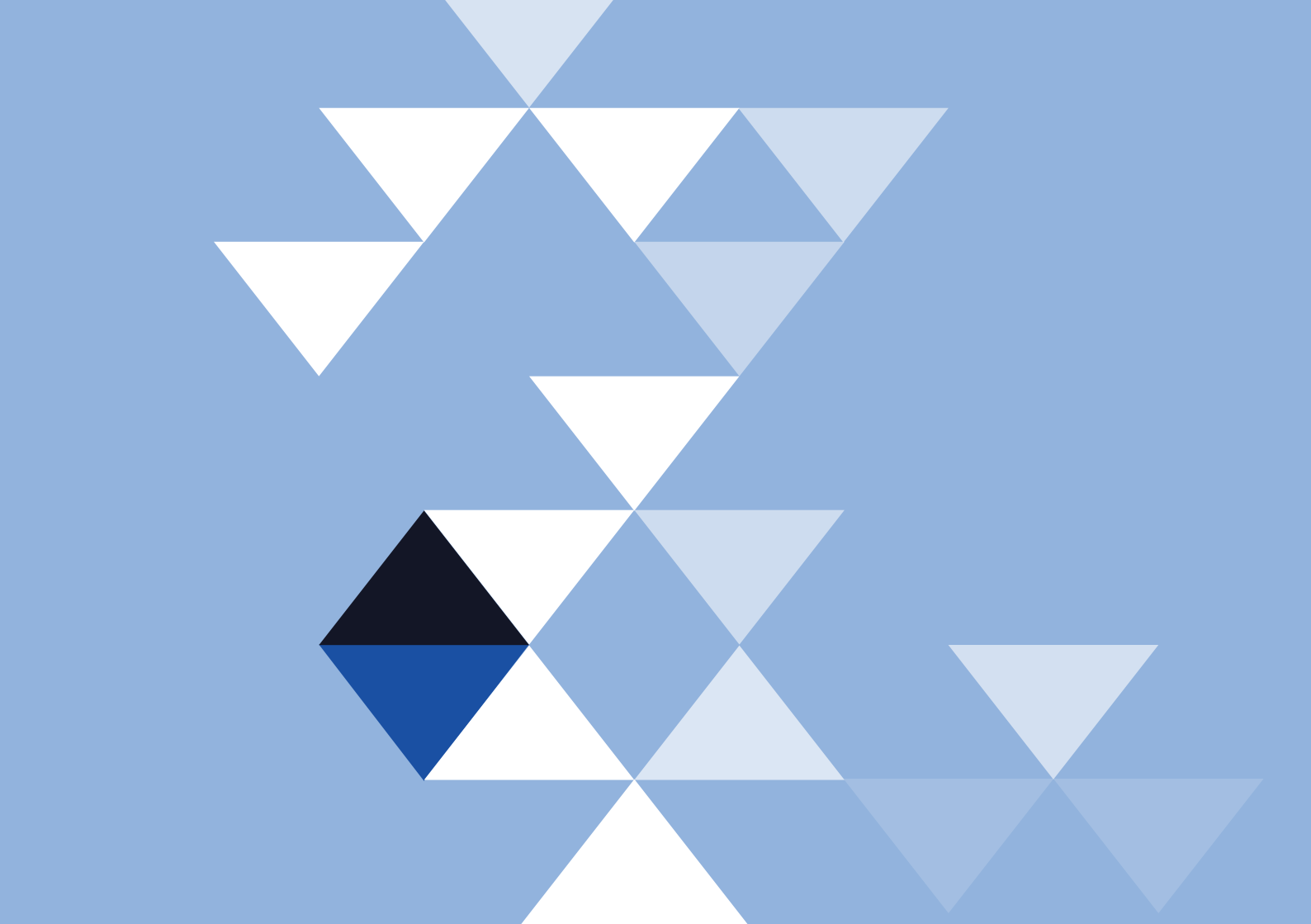
Because our School is now heading in a new interdisciplinary and integrated direction, the following 'what if' questions come to mind: What if we, one way or another, plot the SDGs on to all programmes in order to make them more appropriate for tackling the global challenges that are shaping the world? What if, we embrace technology, science and engineering in order to enrich the art and poetics of design in this age of anxiety? What if, in doing so, the School takes the lead, globally, in absorbing these realities for curating an 'aesthetics of sustainability'?

All three suppositions allude to a new brand of team-based, interdisciplinary research and teaching, which probe deeply and systematically into the complexities of our buildings and cities. Given the significant changes that have been made in the last few years, the School now has the intellectual horse-power to lead and orchestrate this brand of academic practice that requires the synthesis of 'widely different types of knowledge'.

In other words, disciplinary boundaries have got to be relaxed or demobilised. The School now has a reconfigured cadre of faculty which can serve as a catalyst for simultaneously fusing contributions from other disciplines: Engineering, sociology, mathematics, social anthropology, physics, geography and computer science, amongst others.

One last thing: If we get this right it will be a significant innovation that the School could bring to the table of transformation that architectural education so desperately needs. In the words of Leslie Martin, this will contribute to new 'direction' in teaching and give a 'cutting edge' to thought leadership.





# UoL Space Strategy, Planning and Sustainability

## Grant Anderson

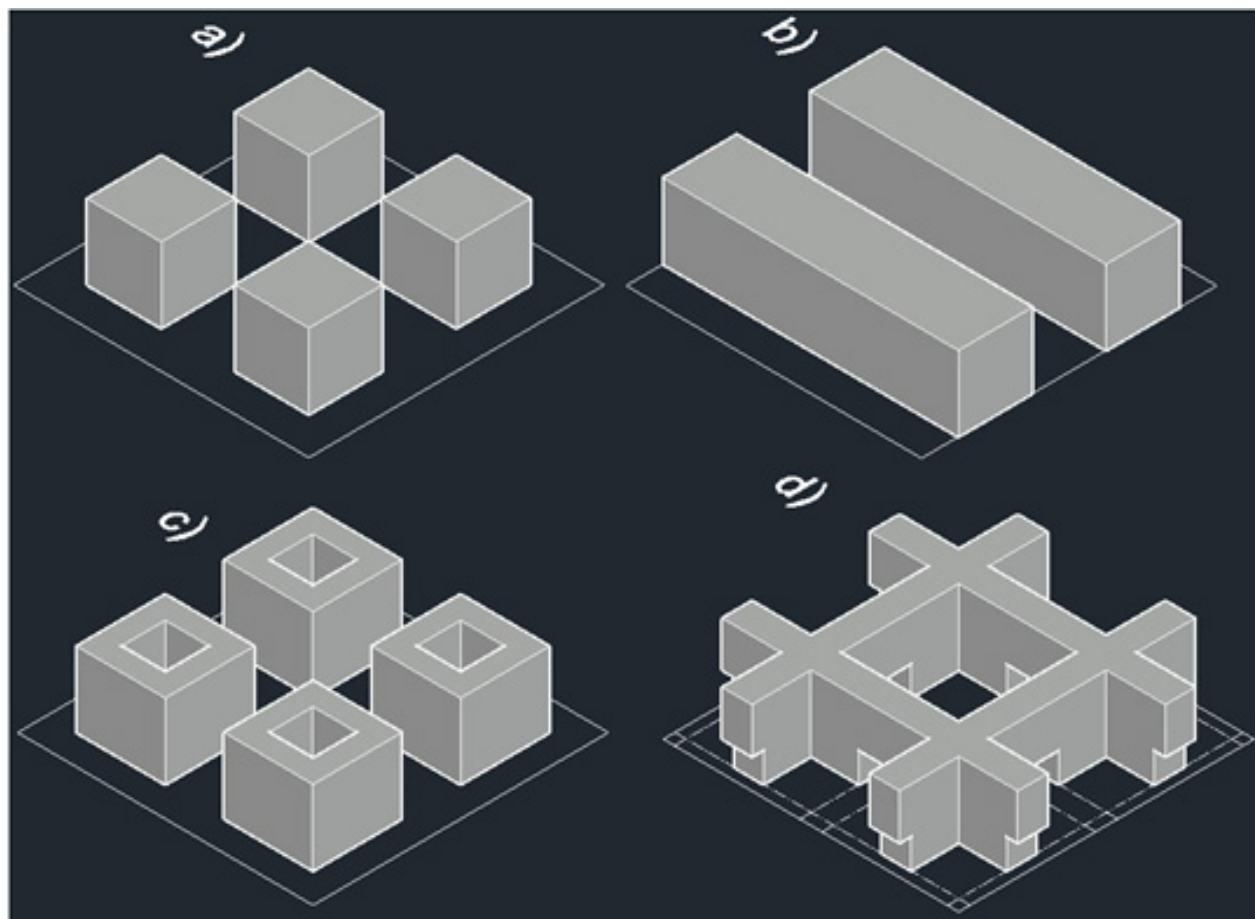
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Since the creation of the University of Lincoln the Estate has grown at a remarkable rate. Averaging approximately one new building per year the Brayford Campus in particular is one of the most impressive new city centre campuses in the UK. With continued growth forecasted, the presentation will examine how the University can reconcile continued growth with carbon reduction obligations.

Grant, a member of the Estates Department Senior Leadership Team, will describe progress to date and aspirations for future carbon reduction at the University. This includes the ambitious carbon neutral Medical School new build and the development of a Smart Grid for the Brayford Pool campus.







# The Relationships between Urban Built Forms and Density Indicators

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In identifying the relationship of energy and urban form, most researchers have attempted to discuss the density of urban form. Hence, it is crucial to primarily define the true definition of urban form and density and their relationships. Different researchers have used a variety of indicators to define density of urban forms. This makes it rather difficult to conduct comparative analysis. Meanwhile, none of the indicators are adequately comprehensive to define density.

This research introduces a novel indicator of urban built form termed "Form Signature". A suite of graphical guidelines is developed to establish the precise relationship of urban built form and density. Generic models of four urban built forms are developed, including pavilion, terrace, court and a tunnel-court, which are introduced in this study in order to compare and distinguish their land-use performance and density characteristics. Selecting plot ratio and site coverage as the most popular and appropriate indicators, the simultaneous effects of number of storeys, plan depth and cut-off angle as the main variables of interest, are graphically shown for different urban built forms. The results illustrate that the tunnel-

court form achieves the greatest density while pavilion achieves the lowest. The findings provide guidelines for urban planning to facilitate the most effective land-use method for each urban built form in order to achieve sustainable cities





# Predicting the Cooling Energy Consumption in the Housing Sector in a Mediterranean Climate | The case of Hebron, Palestine

Shireen Badr Alqadi

*PhD Research Student*

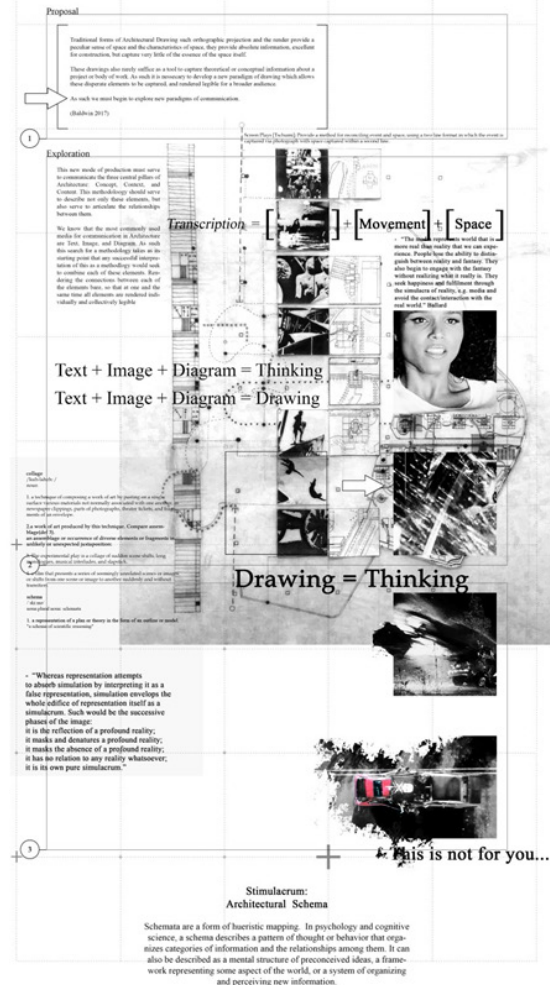
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Energy use in buildings forms a large portion of the global energy demand. Energy used in buildings contribute to climate change, and changes in climate may imply greater demands on space heating and cooling in buildings. Quantifying the energy consumed in the housing sector is a first step to optimize the energy consumption. Due to the lack of submeters and the informal energy use, quantifying the energy consumption for specific purposes is generally a challenging task in the developing world. The main goal of this paper is to estimate the energy consumed for cooling in the Palestinian housing sector. A multimode survey method was used to collect data from 320 households in Hebron to the south of the West Bank. The survey revealed that there are various parameters that have a direct impact on the amount of energy used for cooling of houses. These include: physical characteristics of the houses; the pattern of cooling the houses; the socioeconomic characteristics of the households; in addition to the general level of thermal comfort during summer and the adaptive comfort behaviour. The collected data is used to develop two regression models to estimate the cooling energy consumption

based on the cooling system used by the households in addition to specified socioeconomic characteristics like the households' monthly income and physical parameters like the housing typology and housing age. The models developed can be used as a simplified tool to estimate the cooling consumption in the Palestinian housing sector in Hebron by the households, policy makers and professionals.

# Schema I

The Failure of Drawing:



# Bricolage: Exploring Associative Drawing Techniques as a Tool for the Development of Academic Writing

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The dominance of the Image as a principal means of communication in design and in particular in architecture is not a new phenomenon, by the very nature of our profession we are inherently required to communicate via the image, be it as a means of expression of construction information, a render to persuade a reticent client or planner. This cultural dominance of image as a key means of communication often leads to difficulties when communicating via other means. In particular there is a marked awkwardness of use of the written word.

This paper explores the value of associative graphic and drawing techniques, such as collage, bricolage, and the cut up, as a generative tools. Through a critical reflection on the work of the authors and the manner in which they are produced, it is hoped that others may benefit from the development of these drawings





# The Political Fault Lines in the Rebuilding of Christchurch's Energy Infrastructure

Prof. Hugh Byrd

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The devastation of the city centre of Christchurch, New Zealand, after the 2010 and 2011 earthquakes presented an opportunity to renew infrastructure in a coordinated and efficient manner to allow for a city that was energy efficient, low carbon, resilient and provided both energy security and justice. The research described in this paper records the processes taken to attempt to rebuild the energy infrastructure. The story is one of political decisions overriding appropriate technology and ultimately is a lesson in how not to handle the implementation of post-disaster energy infrastructure. Lack of clarity in decision making by central government and then not pursuing consultant's recommendations led to a scheme that was effectively abandoned in 2016 and described as "a total failure". The paper records the critical events that occurred and explains why the proposed energy infrastructure may have been politically expedient but was technologically inappropriate in this case.

# ARE ARCHITECTS MORE DANGEROUS THAN CLIMATE CHANGE?

# 101

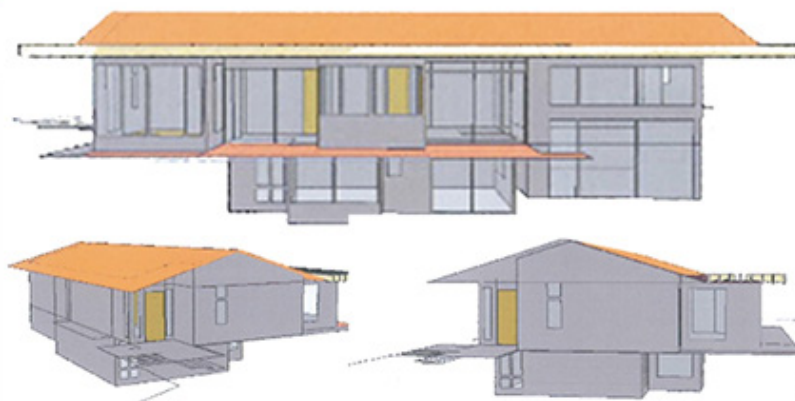
ONE HUNDRED AND ONE award winning houses built over the last 50 years were analysed to see if designers are getting better at producing energy efficient houses.

They may look great but are they good examples of Environmentally Sustainable Design?



All houses were modelled using Ecotect to establish their annual energy consumption. For a fair comparison the model assumed:

- NIWA weather data for the nearest location in NZ
- Occupancy patterns kept the same for all houses
- All houses used heat pumps
- Heating on below 18C. Cooling on above 24C.



From 1978 to 2001, there were no energy Code changes for houses in New Zealand. During that time **award winning houses have increased their energy consumption by 20% per unit floor area on average.** Since 1978, **Code changes in the USA have resulted in halving the energy consumption of buildings.**

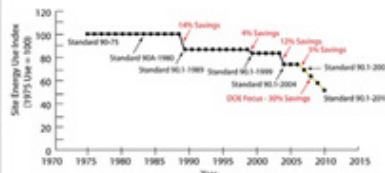
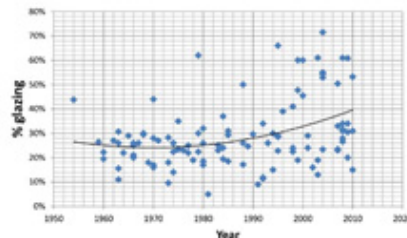


Figure 1: Improvements in the ASHRAE 90.1 code over time. ©2010 ASHRAE (www.ashrae.org). Used with permission from ASHRAE.

% GLAZING TRENDS OVER THE 50 YEAR PERIOD BETWEEN ABOUT 1960-2010



- Best fit curve shows general trend to increase % glazing
- % glazing remained reasonably steady up to around 1985 and has then increased at an average rate of 0.5% per year there after

# Sexy and Dangerous: Architecture in Decline

**Prof. Hugh Byrd**

*Professor of Architecture*

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Architectural awards are generally given soon after completion of a house and the awards tend to reflect the appearance of a building, rather than its performance.

Successful houses may look sexy but how do they perform? This study analysed the environmental performance of award-winning houses in New Zealand over the last 50 years. The aim was to see if designers are becoming more aware of the importance of energy efficiency or learning from the information available from research institutions and others concerning improved energy performance and the implications of climate change.

The results show that over the last 50 years, despite ever more information and guidance, the energy performance has steadily declined. It appears that sexy imagery is more important than the dangers of climate change to architects.



# Heritage-led Urban Regeneration as a Catalyst for Sustainable Urban Development

**Dr Amira Elnokaly**

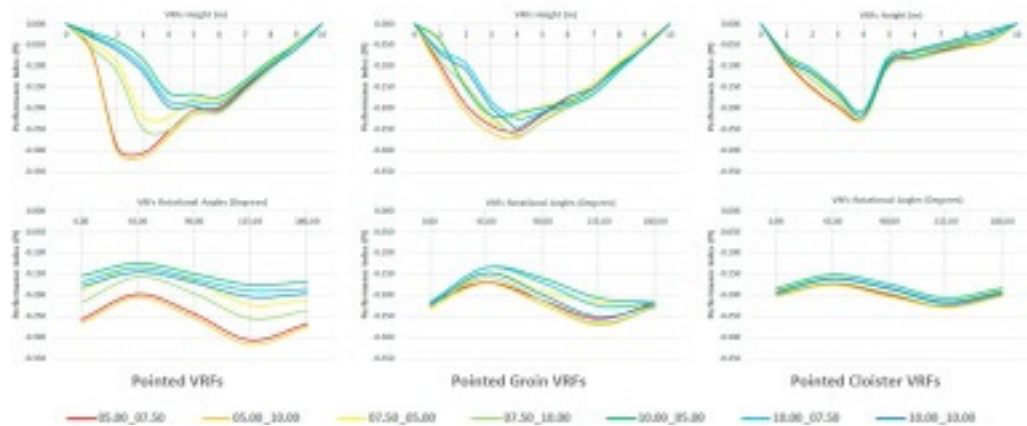
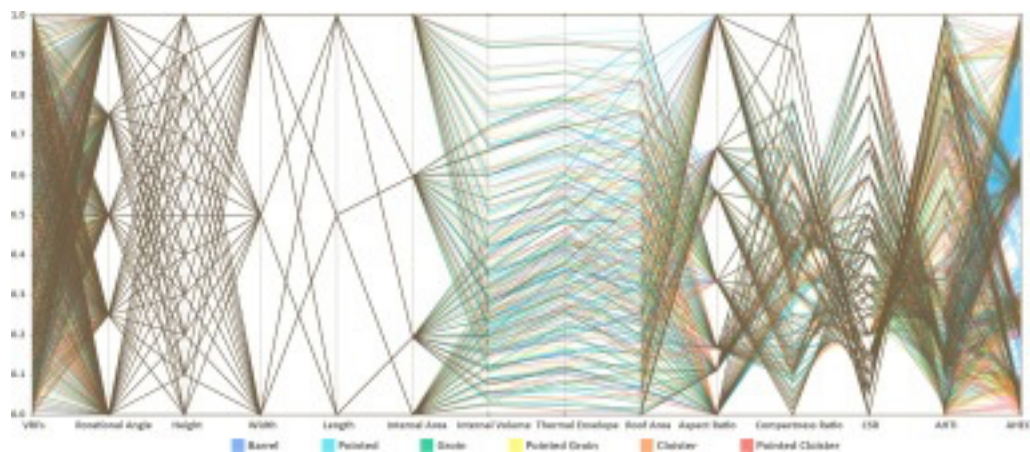
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It is without doubt, the conservation of a nation's cultural heritage is of crucial prominence, as it embraces the sense of belonging and is a major component of quality of life. It also plays a substantial role towards the foundation of the future. In the context of developing countries, large number of cities are enjoying significant cultural heritage embodied in their built environment, specifically within their urban heritage centres. However, such cities face the risk of losing their distinctive character while they strive to modernize, in order to overcome the multiplicity of pressures accompanied with different effects, notably as globalization on one hand and urbanization on the other. Whereas the conservation is an effort of utilizing the past for useful modern functions, different approaches are aiming to draw a balance between conservation and development through acceptable degrees of change, where heritage-led urban regeneration projects are considered as a category. In essence, interventions to conserve architectural landmarks and upgrade infrastructures in heritage cities facing urbanization challenges are of sound significance. Special attention is needed to conserve the urban tissues shaping unique sense of place and character. This research investigates the economic strategies for urban regeneration projects utilizing urban heritage centres to provide sustainable urbanization and inclusive growth. It highlights the role of urban heritage assets in

differentiating cities along with their competition to mobilize investments and promote local economic growth.

The paper investigates a framework of heritage economics that requires a holistic approach interpreting heritage as an asset, with the central question being about identifying the different values of such assets. Different valuation methods are introduced within the notion of total economic value, to assess the contribution of a heritage asset in investments regenerating the economic basis of old cities. A struggle between symbolic significance of heritage cities/towns, their urban form, and the distinctive spirit of place and the many economic and political agendas that are diminishing the heritage sites and sense of place is identified. The study revitalises the lost standing identity of old heritage cities, which would aid developers and stakeholders towards a more socioeconomic sustainable development strategy. In addition, it supports sustaining, preserving and conserving the city's symbolic significance of heritage buildings and distinctive sense of place.





# Parametric investigation of traditional vaulted roofs in hot-arid climates

Dr Amira Elnokaly

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In the Mediterranean and North African regions, traditional vaulted roof forms have been widely used due to their significant influence on enhancing thermal indoor conditions. This research parametrically investigates the thermal performance of vaulted roofs, seeking a better understanding of the reciprocal relationship between the solar irradiance received by these roofs and the resulting energy consumption in the hot-arid city of Aswan (23.58oN), Egypt. The methodological procedure is realized through two phases. The annual simulations of solar irradiance and energy consumption are carried out in the first phase, where the quantitative performance of 2310 different cases are predicted in terms of six vaulted roof forms against eleven key influencing variables.

The unsupervised technique of Principal Component Analysis is used in the second phase to reduce the higher dimensionality of the resulting dataset and extract important information from newly established orthogonal principal components.

The outcomes of this work aim to provide architects and practitioners with an optimized dataset to use in the design and application of vaulted roof forms and support decision makers addressing the development strategies by providing essential data for setting regulations of newly built environments in harsh hot-arid contexts..





# Groundlab: University Community Creative Hub

## Trevor Elvin

*Senior Lecturer in Architecture*

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### Project description

The project sits within the current place-making framework commissioned by the City Council (Openplan nov16) for the regeneration of the Sincil Bank area. It involves the setting up of a joint University community mini hub in Sincil Bank area to work in collaboration with residents groups and other stakeholders, on a range of community projects from small scale urban parklets installations, pop up spaces and street furniture. The studio will exist within a converted shipping container on council owned land on Portland Street and would act as hub, providing a focal point and visible engagement in the regeneration of the area.

### Sincil Bank community

The studio will act as a meeting place to conduct community presentations and exhibitions of regeneration work in progress. It will present a base for community projects and will operate a community drop in design forum for residents, where students, staff, community, the City Council and other stakeholders can exchange ideas, develop, test and build projects over the next few years growing community engagement and collaboration during the regeneration of the area.

### Academic / industry context

Drawing upon the distinctive professional and research expertise

within our academic and student community, academic, and project director, Trevor Elvin will facilitate a range of collaborative projects between the University, the City Council and Sincil Bank community. The studio will feed directly in to academic research centres and student course work, actively engaging with live projects and collaborations within industry.

### Programme of events

University of Lincoln academics and students from across the College of Arts will occupy the studio on a regular basis, collaborating on a range of community engagement projects during the regeneration of the Sincil Bank area. Weekly design studio with students from the School of Architecture and the Built Environment will take place. This will include regular community design meetings and group presentations of work in progress.

This community studio teaching will provide residents with an opportunity to engage with a higher education environment and offer students an immersive learning experience, engaging with live projects, clients and deadlines. The space will also operate as a drop in design forum where residents can exchange and test ideas during the regeneration of the area.

The documentation of the project, which will include text, image and drawings will also result in a public exhibition and publication of the work and outcomes. The studio space will also have a dedicated website/blog promoting digital engagement and dissemination of the project and work.

“The pencil in the Architect’s hand is a bridge between the mind and the image that appears on a sheet of paper”.

(Pallasmaa)

# Architects and drawing: Hepworth Gallery The Big Draw

**Barbara Griffin**

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Drawing, in its purest sense conjures up notions of the Architect and pencil, sketching thoughtfully and intentionally. Through drawing Álvaro Siza states that “Architects transform reality”.

“The pencil in the Architect’s hand is a bridge between the mind and the image that appears on a sheet of paper”. (Pallasmaa). The Architect, and most specifically the hand becomes a fulcrum to carry out the central and essential role in the delivery of the built environment. The tool, be it a pencil or the most sophisticated software is still a tool, bound by the input and inputter, success of the architecture being a result of the ability of the inputter and not the tool.

The Architect and the drawing tool become inextricably linked as without one, the other is inert. Drawing in every form is the Architect’s language. From a concept sketch to discussion with a client, a planner, a contractor. Each verbal description may change but the drawing is the same. To a client the verbal description may consist of explaining basic spaces and door opening and the views from a particular window, to a planner the scale and context, to a contractor the construction

method. Very different conversations, the drawing the same.

Drawing in Architects’ practices is re-emerging potentially as a response to over BIM-ification. Value is being put back on the process and not just the end product. Foster and Partner run life drawing classes every Tuesday for all to attend. Specialists are working with non drawers as a tool to learn and understand and communicate through nonverbal means. Drawing as a tool for communication, thinking and process is paramount to our professional context. The research examines why this is an emerging phenomenon.





## The Question Concerning Life and Architecture

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Are the controversial ideas of Wilhelm Reich a valuable topic worth discussing in contemporary architecture? There is no better way of trying to answer this question than by testing it. This is what happened at the University of Lincoln in 2017.

The University's Philosophy Group offered support and the initial concept while authors of this article, as architectural educators from Lincoln School of Architecture and the Built Environment (LSABE), incorporated it into students' brief.

As a result of the cooperation between the philosophy group Centre of Experimental Ontology and the LSABE, the idea of constructing Lincoln's Orgone Accumulator came into being. The object which once contributed to scientific and even legal controversies later became part of pop culture and is now a legend which stimulates thinkers to reflect on the definition of life. The Lincoln project was instigated by Graham Freestone and transformed into an idea compatible with the University's curriculum.

It has been decided that the process of designing and producing the project would take the form of a 'live project'. According to definitions by Sara (2006) and Watt & Cottrell (2006), live projects in educational terms engage the community with students. Through live projects students produce a real project which is valuable to the client. Every project has its own agenda and criteria making

them very different from each other. For several years, the program called 'Students as producers' at the University of Lincoln helped to promote this form of educational format.

Lincoln's Orgone Accumulator is one of its latest incarnations.





# The Role of A University In City Transformation

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This research investigates the reciprocal spatial impact of universities and their host cities. The study carries out a cross-case analysis between the University of Lincoln and city of Lincoln and with the University of Worcester and the city of Worcester. Both cities are located in United Kingdom (UK), have similar historical backgrounds, and are similar in terms of size and population demographic. Additionally, both universities are relatively new universities.

This study attempts to uncover and clarify how the University of Worcester and the University of Lincoln have transformed their socio-economic and spatial environments in their respective cities. One of the most significant features of this transformation is related to spatial integration and connectivity between the campus and city. This is a complex relationship, that is dependent on many physical and non-physical variables.

This paper presents the results highlighting the spatial configuration of the city/ campus relationship. Space Syntax techniques and observation data are adapted in order to show how campus layouts influence the spatial configuration of the city. The main finding of this research shows that the location of a university campus has a significant impact on the city in physical, social and economic forms.

“Anti-corruption measures and a responsible judiciary, cost- saving housing design, land reforms/reviews of land use act and review of fiscal and monetary policies to reduce inflation and interest rates were strategies to be used to ensure affordable housing”

(Oluranti et al,2016)

# Socio-Cultural Aspects of Affordable Housing In Nigeria

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Affordable housing is still out of reach for those who need it in Nigeria for as Iwuagwu(2015), opines 'what Nigeria needs to survive the wounds of near-homelessness include good governance, increased access to land credit, affordable housing and environmentally sound and serviced human settlements'. The imbalance in the supply and demand factors in housing production with the growing rate of population, the challenges of land acquisition costs, inefficient and dysfunctional mortgage industry, street urchins and their notorious interference in construction development through their illegal, local levies foisted on prospective construction sites contribute to the existing state of lack of suitable affordable housing.

'Anti-corruption measures and a responsible judiciary, cost- saving housing design, land reforms/reviews of land use act and review of fiscal and monetary policies to reduce inflation and interest rates were strategies to be used to ensure affordable housing'(Oluranti et al,2016). However, inasmuch as most of these strategies have been implemented by successive Nigerian governments at one time or the other, there still remains gaps which are unfilled and could contribute to reasons why affordable housing remains elusive, at least to a considerable extent. These unfilled gaps are traceable to shortcomings in government/private sector interventions in mass housing projects which are either uncompleted or completed but abandoned. This condition creates a sense of 'disconnect' between the decision making process and community participation, which exposes the absence of

an integration of the socio-cultural life pattern of the people in the strategies implemented.

Further, in two south eastern Nigeria cities of Owerri and Enugu, which are traditionally administrative headquarters, an emerging trend has accentuated the housing affordability crisis. These cities are metamorphosing into high commercial centres with unusual traffic congestions. Major residential estates and buildings are being taken over by businesses ranging from supermarkets, boutiques, pharmacies, banks, clinics, phone shops, eateries etc, thereby creating a shortfall of available and affordable housing in these cities.

Evidently, existing strategies and measures have not so far addressed the socio-cultural aspects of housing in Nigeria.

Chiu (2004) iterates that 'the sustainability of housing development should embrace the environmental, social, cultural and economic aspects of housing'. The social and cultural aspects of housing contribute to gaining in-depth understanding of the intricacies of everyday life within houses and in external communal spaces. As a result of this, housing affordability can also be viewed as the 'behavioural and socio-cultural aspects of built form that imbue environments with meanings and help to create a sense of place'(Chokor,2005). Taking the discourse a little further, such an approach would define a true 'sense' of space and place which is desirable in an affordable house.

Researching this missing knowledge within the framework and discourse of affordable housing in South East Nigeria, will lead to a new understanding of the socio- cultural aspects of affordable housing in Nigeria.

“Since 1998, a growing body of knowledge has been emerging from the IGLC community, in relation to synergies between LC and Sustainability.”



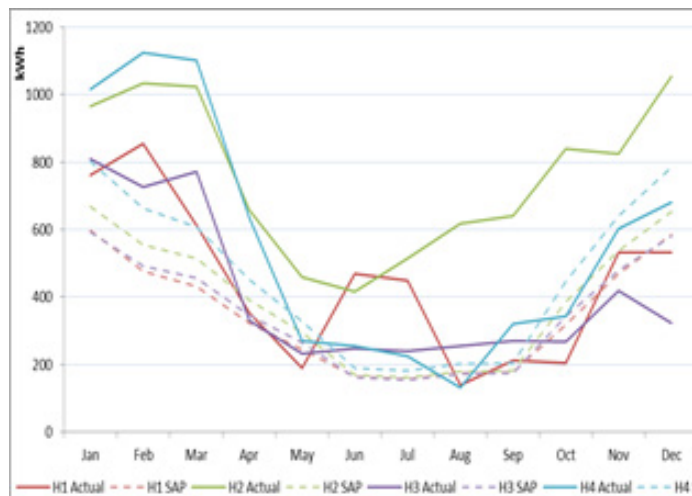
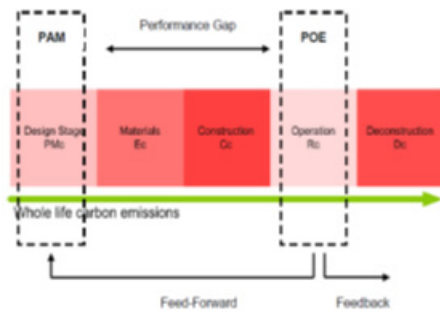
## Lean Construction

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It has been argued that Lean Construction (LC) offers the conceptual basis and the appropriate methods and tools needed for helping the construction industry meet the challenges of sustainable development. Since 1998, a growing body of knowledge has been emerging from the IGLC community, in relation to synergies between LC and Sustainability. Both seek to reduce waste and maximise value, but through different approaches and perspectives. The most common mistake, however, is a tool-focused framework for integration, which overlooks the conceptual differences between these two initiatives. The aim of this study, therefore, is to review the progress made in understanding the linkages and inconsistencies between the two initiatives, through conducting a critical systematic literature review (SLR) and synthesising the findings of 'LC and Sustainability' studies published in IGLC conferences over the past 25 years. The findings of the study provide an overview of previous studies about the topic, reveal major limitations in approaches to LC and Sustainable Construction (SC), and divulge significant opportunities for further work that remain unexplored.



# The potential of Post Occupancy Evaluations (POE) in reducing the performance gap

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This research highlights the potential of Post Occupancy Evaluation (POE) of buildings, as well as the limitations of national house rating systems in meeting the challenge of providing low carbon housing. It argues how POE of buildings provides insights into the environmental performance and user's behaviour which can be used for fine tuning the building's operation resulting in energy savings, and enhancing user comfort and wellbeing.

The research identifies possible reasons for the wide spread gaps between predicted and actual performances using data obtained from a range of Post Occupancy Evaluation (POE) programmes. It also argues the potential of POE in improving the whole life performance of buildings and reducing their carbon emissions.

Possible reasons for performance gaps are identified. The findings of research suggest that focus should be shifted towards adopting a socio-technical approach to the procurement of sustainable low energy homes as compared with too much reliance on technology alone.

Although the study offers comparisons between actual and predicted performance, the intension is not to solely demonstrate the accuracy of national energy systems which are used for the purposes of national building regulation compliances, but also to discuss how energy demands may be influenced due to occupancy behaviour.

Among the main lessons learnt from the POE analysis carried out is that users' interactions with their homes and their life styles is among the determining factors influencing the performance of their homes.





# Insight / Inside Learning. A Participatory App for Analysing the Effectiveness of School Environments – Reporting the Findings of an Exploratory Study

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Our understanding of school building design in relation to its effects on learning is surprisingly underdeveloped. This is due to the complex nature of the environments, the lack of consensus about the criteria for their pedagogical assessment, and the attendant methodological challenges. Post-occupancy evaluations typically fail to assess whether the school estate can support a particular institution's pedagogical approach and they rarely consider the views of their key constituents – pupils. Whilst there appears to be a strong link between effective engagement with users and the success of environmental change in having an impact on behaviour, well-being, and attainment, facilitating such collective decision making is often challenging.

The conventional methods do not yield findings that are accepted among the diverse range of professionals and communities involved in procuring, designing, maintaining, and inhabiting school buildings. We know that school buildings matter, but we have a limited knowledge of why or, indeed, how they matter.

By using theoretical concepts from developmental psychology and evolutionary approaches to both education and the perception of the physical environment, this study explored how the design of secondary schools affects pupils' appetites for learning and promotes innovative pedagogical practices.

The research tool employed the Experience Sampling Method (ESM). It collected images of the pupil participants' surroundings and information about their school related experience in situ – by sampling the participants' thoughts and feelings as they occurred and in the environment within which they occurred.

Statistically significant immediate and lagged associations with pupils' task-specific internal motivation were found regarding the perceived quality of classrooms.

Significant differences have been found between two cases in the perception of open-space learning environments, which is associated with particular pedagogical approaches. The study revealed the complexity of the relationship between the school buildings and the educational activities that take place within them. Data suggested that pupils in each case study setting understood differently the criteria of what makes a good quality learning environment.

This project was funded by the AHRC and was a part of larger collaboration between the University of Cambridge and SCABAL Architects.





# Burnout in Architecture Students: Assessing the Relationship between Architectural Education and the Symptoms of Burnout

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The stigma of burnout within architectural education is a widely known issue, yet a sparsely investigated topic. Burnout is defined by Maslach and Jackson's (1981) and Freudenberger's (1974) theories as symptoms of emotional exhaustion, cynicism and reduced professional efficacy, due to making excessive demands on personal energy, strength or resources. Architecture as a subject carries a preconceived mindset that one must work long hours and have minimal time for other activities during study and students will swiftly adhere to this. Working longer hours does not always equate to the production of more work, it does however, correlate to the frequency a person could suffer from the symptoms of burnout.

We can become so fixated on working long hours that we forget what we are neglecting from our lives. Not only does the overworking individual begin to suffer, the people in direct contact suffer also. Family, friends, colleagues, team mates etc. are affected due to changes in attitude and infrequency of contact. Monaghan (2001) describes this architectural state of mind as the insane little bubble of nonreality, a fitting explanation of a common occurrence. While strong work ethic is admirable, it should be fed off a balanced lifestyle or it will inevitably lead to periods of high stress, followed by burning out (Maslach, 2017).

The aim of this research was to investigate how burnout is physically and mentally affecting students that are currently enrolled onto architectural education. To achieve this, a questionnaire was presented to thirty-six students from various academic years and universities to gain a wider perspective of these topics. The findings were compared to literature from both burnout and architectural education sources separately to critically evaluate if theory and research aligned. Results from the questionnaire conclusively showed that 97% of respondents have suffered from the symptoms of burnout, whilst also uncovering a variety of unlisted yet worrying symptoms. It is evident that more must be done in preventing the occurrences of burnout and this research aims to show the importance of the subject.





# Don't shoot the messenger: Quality assurance as a fundamental component of teaching and learning

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Quality assurance is a vital part of contemporary society, let alone a critical component of teaching and learning at tertiary level. This is more so in a world in which Universities are the 'Service Provider' and the student body, the 'client'. This change in relationship may well have detractors who declare that the power balance obliterates the intention of public education; at the same time it is also a relationship which demands change, rigour and defensible environments for both faculty and students. This paper will interrogate the purpose of quality assurance in architectural education through examining similar models from around the world, in order to best position ourselves and our teaching in a neo-liberal, increasingly challenged academic environment.



# A Brief Spark: Modernist Municipal Architecture in 1960s Pietermaritzburg

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Well-crafted buildings produced in municipal contexts are a strong marker of the value that individual cities place on architects and their contribution to the built environment. Often, civic buildings reflect particular periods of economic growth and recession – when the private sector is booming, architects tend to flourish in practice, and when work is short, good practitioners are willing to risk the jaundiced role of the civil service.

Pietermaritzburg, once the capital of the Colony of Natal and the current capital of the contemporary province of KwaZulu-Natal, is no different. Established in 1843, its civic architecture reflects the sentiments of Britain, as well as post-colony political imperatives which affected the built environment such as the hybridised Union Period which flourished between 1910 and the late 1950s. Architectural professionals working in the city were scarce: the City Engineers Department as a dedicated works unit emerged in the mid-twentieth century, and certainly a dedicated architectural unit was only established around 1955. Until then, much significant public architecture was put out to competition or tender, whilst the more modest and utilitarian structures remained in-house designs, usually by technicians who employed formulaic design. From around 1955 until the mid-1960s, civic architecture in Pietermaritzburg

was characterised by well-crafted, signature buildings in a strongly Modernist style. Far from formulaic, the reason for this proliferation of structures spoke to urban expansion, and particularly, buildings constructed in order to entrench various aspects of the Group Areas Act originally promulgated in 1950. Whilst the name of the architect employed by the city in these works remains a mystery, this paper investigates how this veneer of good building practise added a significant but silent layer to much of the civic architecture of the Borough.





## Thank you

This year's Indaba was planned by a dedicated team that, for the last few months, has worked hard to produce another successful moment in the School of Architecture and the built Environment.

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